

We claim:

1. An alloy steel in weight percentage consisting essentially of from about 0.16% to about 0.35% carbon, about 0.85% maximum manganese, about 1.25% maximum silicon, about 1.50% to about 3.25% chromium, about 5.00% maximum nickel, about 0.55% maximum molybdenum, about 0.70% to about 3.25% tungsten, about 0.05% to about 0.30% vanadium, about 0.50% maximum copper, about 0.015% maximum phosphorous, about 0.012% maximum sulfur, about 0.02% maximum calcium, about 0.14% maximum nitrogen, about 0.05% maximum aluminum, and balance essentially iron.
2. The alloy steel as in claim 1, consisting essentially of about 0.28% carbon, about 0.74% manganese, about 0.012% phosphorus, about 0.003% sulfur, about 1.03% nickel, about 2.75% chromium, about 0.011% aluminum, about 1.17% tungsten, about 1% silicon, about 0.36% molybdenum, about 0.0073% nitrogen, about 0.06% vanadium, about 0.1% copper, about 0.02% calcium, and balance essentially iron.
3. A method of thermally processing an alloy steel comprising:
  - a) normalizing;
  - b) austenitizing;
  - c) oil quenching; and
  - d) tempering.
4. The method as in claim 3, wherein normalizing further comprises:
  - a) charging the alloy steel into a furnace below 500°F;
  - b) heating the alloy steel at 125°F maximum per hour to about 1725-1775°F;
  - c) maintaining the alloy steel at 1750°F for 1 hour per inch of section size;and
  - d) cooling the alloy steel in air at room temperature.
5. The method as in claim 3, wherein austenitizing further comprises:
  - a) charging the alloy steel into a furnace below 500°F;

- b) heating the alloy steel at 125°F maximum per hour to about 1675-1725°F;
- and
- c) maintaining the alloy steel at 1700°F for 1 hour per inch of section size.
6. The method as in claim 3, wherein the alloy steel is oil quenched to below 125°F.
7. The method as in claim 6, wherein the alloy steel is still air-cooled to about 975-1025°F prior to oil quenching.
8. The method as in claim 3, wherein tempering further comprises:
- a) charging the alloy steel into a furnace below 500°F;
  - b) heating the alloy steel at 100°F maximum per hour to about 490-510°F;
  - c) maintaining the alloy steel at 500°F for 1 hour per inch of section size; and
  - d) cooling the alloy steel in air at room temperature.
9. A method of thermally processing an alloy steel comprising:
- a) normalizing;
  - b) austenitizing;
  - c) gas quenching; and
  - d) tempering.
10. The method as in claim 9, wherein normalizing further comprises:
- a) charging the alloy steel into a furnace below 500°F;
  - b) heating the alloy steel at 900°F maximum per hour to about 1725-1775°F;
  - c) maintaining the alloy steel at 1750°F for 1 hour per inch of section size;
- and
- d) cooling the alloy steel in air at room temperature.
11. The method as in claim 9, wherein austenitizing further comprises:
- a) charging the alloy steel into a furnace below 500°F;
  - b) heating the alloy steel at 900°F maximum per hour to about 1675-1725°F;
- and

- c) maintaining the alloy steel at 1700°F for 1 hour per inch of section size.
12. The method as in claim 9, wherein the alloy steel is helium or nitrogen gas quenched to below 125°F.
13. The method as in claim 12, wherein stimulating air-cooling the alloy steel with helium or nitrogen to about 975-1025°F occurs prior to gas quenching.
14. The method as in claim 9, wherein tempering further comprises:
- a) charging the alloy steel into a furnace below 500°F;
  - b) heating the alloy steel at 100°F per hour to about 490-510°F;
  - c) maintaining the alloy steel at 500°F for 1 hour per inch of section size; and
  - d) cooling the alloy steel in air at room temperature.
15. The method as in claim 9, wherein tempering further comprises:
- a) charging the alloy steel into a furnace below 500°F;
  - b) heating the alloy steel at 100°F maximum per hour to about 490-510°F; and
  - c) maintaining the alloy steel at 500°F for 1 hour per inch of section size.
16. A method of thermally processing an alloy steel comprising:
- a) normalizing;
  - b) austenitizing;
  - c) water quenching; and
  - d) tempering.
17. The method as in claim 16, wherein normalizing further comprises:
- a) charging the alloy steel into a furnace below 500°F;
  - b) heating the alloy steel at 125°F maximum per hour to about 1725-1775°F;
  - c) maintaining the alloy steel at 1750°F for 1 hour per inch of section size;
- and
- d) cooling the alloy steel in air at room temperature.

18. The method as in claim 16, wherein austenitizing further comprises:
  - a) charging the alloy steel into a furnace below 500°F;
  - b) heating the alloy steel at 125°F maximum per hour to about 1675-1725°F;and
  - c) maintaining the alloy steel at 1700°F for 1 hour per inch of section size.
19. The method as in claim 16, wherein quenching comprises:
  - a) still air cooling the alloy steel to about 975-1025°F; and
  - b) water quenching the alloy steel to below 125°F.
20. The method as in claim 16, wherein tempering further comprises:
  - a) charging the alloy steel into a furnace below 500°F;
  - b) heating the alloy steel at 100°F maximum per hour to about 490-510°F;
  - c) maintaining the alloy steel at 500°F for 1 hour per inch of section size; and
  - d) cooling the alloy steel in air at room temperature.
21. A bomb casing material comprising the alloy steel in weight percentage as in claim 1.
22. A bomb casing material comprising the alloy steel in weight percentage as in claim 2.